

Application No. 09/991,247  
Amendment dated April 21, 2004  
Reply to Final Office Action of January 30, 2004

### **AMENDMENTS TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### **Listing of Claims:**

1. (previously presented) A system including an interbody spinal implant for insertion at least in part into an implantation space formed across a disc space between adjacent vertebral bodies of a human spine and into at least a portion of the endplates of the vertebral bodies, said implant comprising:
  - a body having a leading end for insertion first into the disc space and a trailing end opposite said leading end;
  - opposite upper and lower surfaces adapted to be placed in contact with and to support the adjacent vertebral bodies;
  - opposite sides between said leading and trailing ends and between said upper and lower surfaces, said upper and lower surfaces being arcuate in a direction from one of said opposite sides to another of said opposite sides;
  - a plurality of forward-facing projections extending from said upper and lower surfaces for engaging the adjacent vertebral bodies, at least one of said projections having a leading face and a rearward portion, said leading face and said rearward portion each having a length and a slope, the length of said leading face being longer than the length of said rearward portion, the slope of said rearward portion being steeper than the slope of said leading face;
  - an opening passing through said upper and lower surfaces for permitting for the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant; and
  - said implant being manufactured from a composite of cortical bone particles and at least one bioresorbable material, said cortical bone particles and said at least one bioresorbable material being combined to form a machinable material from which said implant is manufactured.

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2. (previously presented) The system of claim 1, wherein said composite includes cortical bone fibers.
3. (previously presented) The system of claim 1, wherein said composite includes cortical bone filaments.

Claim 4 (cancelled).

5. (previously presented) The system of claim 1, wherein said bioresorbable material includes plastics.
6. (previously presented) The system of claim 1, wherein said bioresorbable material includes ceramic.
7. (previously presented) The system of claim 1, wherein said bioresorbable material includes composite plastics.
8. (previously presented) The system of claim 1, wherein at least one of said projections has a height as measured from the root diameter of said implant that is in the range of 0.25 mm to 1.5 mm.
9. (previously presented) The system of claim 1, wherein each of said projections comprises at least one of a ridge and a ratchet.
10. (previously presented) The system of claim 1, wherein said upper and lower surfaces are porous.
11. (previously presented) The system of claim 1, wherein said upper and lower surfaces include a bone ingrowth surface.
12. (previously presented) The system of claim 1, wherein at least a portion of said upper and lower surfaces are in an angular relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.
13. (previously presented) The system of claim 1, wherein at least a portion of said leading end is tapered for facilitating insertion of said implant between the two adjacent vertebral bodies.
14. (previously presented) The system of claim 1, in combination with a fusion promoting material other than bone.

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15. (previously presented) The system of claim 1, further in combination with bone morphogenetic protein.
16. (previously presented) The system of claim 1, further in combination with genetic material coding for production of bone.
17. (previously presented) The system of claim 1, further in combination with a chemical substance to inhibit scar formation.
18. (previously presented) The system of claim 1, in combination with at least one of hydroxyapatite and hydroxyapatite tricalcium phosphate.
19. (previously presented) The system of claim 1, in combination with a hollow tube configured to guide the insertion of said implant into the spine.
20. (previously presented) The system of claim 19, further in combination with a bone removal device configured for passage through said hollow tube.
21. (previously presented) The system of claim 20, wherein said bone removal device is one of a drill and a mill.
22. (previously presented) The system of claim 1, in combination with a driver instrument for inserting said implant into the spine.
23. (previously presented) The system of claim 1, wherein said opening is generally oval-shaped.
24. (previously presented) The system of claim 1, wherein said implant includes a plurality of openings passing through said upper and lower surfaces for permitting bone growth from adjacent vertebral body to adjacent vertebral body through said implant.
25. (currently amended) The system of claim 1, wherein said trailing end includes at least one opening for engagement with a driver instrument.
26. (currently amended) The system of claim 25, wherein said ~~at least one~~ opening is threaded.
27. (currently amended) The system of claim 26, further comprising ~~at least~~ a second opening, said ~~at least~~ second opening being adapted to receive a peg.
28. (currently amended) The system of claim 1, wherein said trailing end includes up to four ~~at least three~~ openings for engagement with the insertion instrument.

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29. (previously presented) A system including an interbody spinal implant for insertion at least in part into an implantation space formed across a disc space between adjacent vertebral bodies of a human spine and into at least a portion of the endplates of the vertebral bodies, said implant comprising:
- a body having a leading end for insertion first into the disc space, a trailing end opposite said leading end, a mid-longitudinal axis through said leading and trailing ends, a width transverse to the mid-longitudinal axis, and a height transverse to both the width and the mid-longitudinal axis, said implant having a maximum width that is less than a maximum height;
  - opposite upper and lower surfaces adapted to be placed in contact with and to support the adjacent vertebral bodies;
  - opposite sides between said leading and trailing ends and between said upper and lower surfaces;
  - an opening passing through said upper and lower surfaces for permitting for the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant; and
  - said implant being manufactured from a composite of cortical bone particles and at least one bioresorbable material, said cortical bone particles and said at least one bioresorbable material being combined to form a machinable material from which said implant is manufactured.
30. (previously presented) The system of claim 29, wherein at least one of said opposite sides is at least in part arcuate.
31. (previously presented) The system of claim 29, wherein at least one of said opposite sides is at least in part convex.
32. (previously presented) The system of claim 29, wherein at least one of said opposite sides is at least in part concave.
33. (previously presented) The system of claim 29, wherein at least one of said opposite sides is at least in part flat.

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34. (previously presented) The system of claim 29, wherein said upper and lower surfaces have a plurality of surface projections for engaging the adjacent vertebral bodies to maintain said implant within the implantation space.
35. (previously presented) The system of claim 34, wherein said surface projections comprise at least one of ridges, ratcheting, splines, and knurling.
36. (previously presented) The system of claim 34, wherein said surface projections are forward-facing to facilitate insertion into the implantation space and to prevent expulsion of said implant in a direction opposite to the direction of insertion of said implant into the implantation space.
37. (previously presented) The system of claim 29, wherein said composite includes cortical bone fibers.
38. (previously presented) The system of claim 29, wherein said composite includes cortical bone filaments.
39. (previously presented) The system of claim 29, wherein said bioresorbable material includes plastics.
40. (previously presented) The system of claim 29, wherein said bioresorbable material includes ceramic.
41. (previously presented) The system of claim 29, wherein said bioresorbable material includes composite plastics.
42. (previously presented) The system of claim 29, wherein said upper and lower surfaces are at least in part arcuate.
43. (previously presented) The system of claim 29, wherein said upper and lower surfaces are porous.
44. (previously presented) The system of claim 29, wherein said upper and lower surfaces include a bone ingrowth surface.
45. (previously presented) The system of claim 29, wherein at least a portion of said upper and lower surfaces are in an angular relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.

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46. (previously presented) The system of claim 29, wherein at least a portion of said leading end is tapered for facilitating insertion of said implant between the two adjacent vertebral bodies.
47. (previously presented) The system of claim 29, in combination with a fusion promoting material other than bone.
48. (previously presented) The system of claim 29, in combination with a fusion promoting substance.
49. (previously presented) The system of claim 48, wherein said fusion promoting material is at least one of bone, bone morphogenetic protein, genetic material coding for production of bone, hydroxyapatite, and hydroxyapatite tricalcium phosphate.
50. (previously presented) The system of claim 29, further in combination with a chemical substance to inhibit scar formation.
51. (previously presented) The system of claim 29, in combination with a hollow tube configured to guide the insertion of said implant into the spine.
52. (previously presented) The system of claim 51, further in combination with a bone removal device configured for passage through said hollow tube.
53. (previously presented) The system of claim 52, wherein said bone removal device is one of a drill and a mill.
54. (previously presented) The system of claim 29, in combination with a driver instrument for inserting said implant into the spine.
55. (previously presented) The system of claim 29, wherein said implant includes a plurality of openings passing through said upper and lower surfaces for permitting bone growth from adjacent vertebral body to adjacent vertebral body through said implant.
56. (currently amended) The system of claim 29, wherein said trailing end includes at least one opening for engagement with a driver instrument.
57. (currently amended) The system of claim 56, wherein said ~~at least one~~ opening is threaded.

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58. (currently amended) The system of claim 57, further comprising ~~at least~~ a second opening, said ~~at least~~ second opening being adapted to receive a peg.
59. (currently amended) The system of claim 29, wherein said trailing end includes up to four ~~at least three~~ openings for engagement with the insertion instrument.
60. (previously presented) A system including an interbody spinal implant for insertion at least in part into an implantation space formed across a disc space between adjacent vertebral bodies of a human spine and into at least a portion of the endplates of the vertebral bodies, said implant comprising:
- a body having a leading end for insertion first into the disc space, a trailing end opposite said leading end, and a length therebetween;
  - opposite upper and lower surfaces adapted to be placed in contact with and to support the adjacent vertebral bodies;
  - opposite sides between said leading and trailing ends and between said upper and lower surfaces, said opposite sides being at least in part smooth along a substantial portion of the length of said opposite sides, said upper and lower surfaces being at least in part arcuate from one of said opposite sides to the another of said opposite sides;
  - a plurality of projections extending from said upper and lower surfaces for engaging the adjacent vertebral bodies to maintain said implant within the implantation space;
  - an opening passing through said upper and lower surfaces for permitting for the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant; and
  - said implant being manufactured from a composite of cortical bone particles and at least one bioresorbable material, said cortical bone particles and said at least one bioresorbable material being combined to form a machinable material from which said implant is manufactured.
61. (previously presented) The system of claim 60, wherein at least one of said opposite sides is at least in part arcuate.

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62. (previously presented) The system of claim 60, wherein at least one of said opposite sides is at least in part convex.
63. (previously presented) The system of claim 60, wherein at least one of said opposite sides is at least in part concave.
64. (previously presented) The system of claim 60, wherein at least one of said opposite sides is at least in part flat.
65. (previously presented) The system of claim 60, wherein said surface projections comprises at least one of ridges, ratcheting, splines, and knurling.
66. (previously presented) The system of claim 60, wherein said surface projections are forward-facing to facilitate insertion into the implantation space and to prevent expulsion of said implant in a direction opposite to the direction of insertion of said implant into the implantation space.
67. (previously presented) The system of claim 60, wherein said composite includes cortical bone fibers.
68. (previously presented) The system of claim 60, wherein said composite includes cortical bone filaments.
69. (previously presented) The system of claim 60, wherein said bioresorbable material includes plastics.
70. (previously presented) The system of claim 60, wherein said bioresorbable material includes ceramic.
71. (previously presented) The system of claim 60, wherein said bioresorbable material includes composite plastics.
72. (previously presented) The system of claim 60, wherein said upper and lower surfaces are porous.
73. (previously presented) The system of claim 60, wherein said upper and lower surfaces include a bone ingrowth surface.
74. (previously presented) The system of claim 60, wherein at least a portion of said upper and lower surfaces are in an angular relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.



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75. (previously presented) The system of claim 60, wherein at least a portion of said leading end is tapered for facilitating insertion of said implant between the two adjacent vertebral bodies.
76. (previously presented) The system of claim 60, in combination with a fusion promoting material other than bone.
77. (previously presented) The system of claim 60, in combination with a fusion promoting substance.
78. (previously presented) The system of claim 77, wherein said fusion promoting material is at least one of bone, bone morphogenetic protein, genetic material coding for production of bone, hydroxyapatite, and hydroxyapatite tricalcium phosphate.
79. (previously presented) The system of claim 60, further in combination with a chemical substance to inhibit scar formation.
80. (previously presented) The system of claim 60, in combination with a hollow tube configured to guide the insertion of said implant into the spine.
81. (previously presented) The system of claim 80, further in combination with a bone removal device configured for passage through said hollow tube.
82. (previously presented) The system of claim 81, wherein said bone removal device is one of a drill and a mill.
83. (previously presented) The system of claim 60, in combination with a driver instrument for inserting said implant into the spine.
84. (previously presented) The system of claim 60, wherein said implant includes a plurality of openings passing through said upper and lower surfaces for permitting bone growth from adjacent vertebral body to adjacent vertebral body through said implant.
85. (currently amended) The system of claim 60, wherein said trailing end includes at least one opening for engagement with a driver instrument.
86. (currently amended) The system of claim 85, wherein said ~~at least one~~ opening is threaded.

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87. (currently amended) The system of claim 86, further comprising ~~at least~~ a second opening, said ~~at least~~ second opening being adapted to receive a peg.
88. (currently amended) The system of claim 60, wherein said trailing end includes up to four ~~at least three~~ openings for engagement with the insertion instrument.